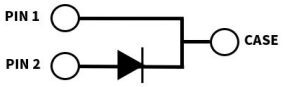
# C6D04065A

## 6th Generation 650 V, 4 A Silicon Carbide Schottky Diode




Package Type: TO-220-2
Marking: C6D04065A

### Description

With the performance advantages of a Silicon Carbide (SiC) Schottky Barrier diode, power electronics systems can expect to meet higher efficiency standards than Si-based solutions, while also reaching higher frequencies and power densities. SiC diodes can be easily paralleled to meet various application demands, without concern of thermal runaway. In combination with the reduced cooling requirements and improved thermal performance of SiC products, SiC diodes are able to provide lower overall system costs in a variety of diverse applications.

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### Features

- Low Forward Voltage ($V_F$) Drop with Positive Temperature Coefficient
- Zero Reverse Recovery Current / Forward Recovery Voltage
- Temperature-Independent Switching Behavior

### Typical Applications

- Industrial Switched Mode Power Supplies
- Uninterruptible & AUX Power Supplies
- Boost for PFC & DC-DC Stages
- Solar Inverters

### Maximum Ratings ($T_C$ = 25°C Unless Otherwise Specified)

| Parameter | Symbol | Value | Unit | Test Conditions | Notes |
|---|---|---|---|---|---|
| Repetitive Peak Reverse Voltage | $V_{RRM}$ | 650 | V | | |
| DC Blocking Voltage | $V_{DC}$ | 650 | | | |
| Continuous Forward Current | $I_F$ | 18 | A | $T_C$ = 25 °C | Fig. 3 |
| | | 9 | | $T_C$ = 125 °C | |
| | | 4 | | $T_C$ = 160 °C | |
| Repetitive Peak Forward Surge Current | $I_{FRM}$ | 19 | | $T_C$ = 25 °C, $t_p$ = 10 ms, Half Sine Wave | |
| | | 12 | | $T_C$ = 110 °C, $t_p$ = 10 ms, Half Sine Wave | |
| Non-Repetitive Forward Surge Current | $I_{FSM}$ | 32 | | $T_C$ = 25 °C, $t_p$ = 10 ms, Half Sine Wave | Fig. 8 |
| | | 28 | | $T_C$ = 110 °C,$t_p$ = 10 ms, Half Sine Wave | |
| Non-Repetitive Peak Forward Surge Current | $I_{F,Max}$ | 290 | | $T_C$ = 25 °C, $t_p$ = 10 µs, Pulse | |
| | | 200 | | $T_C$ = 110°C, $t_p$ = 10 µs, Pulse | |
| Power Dissipation | $P_{tot}$ | 60 | W | $T_C$ = 25 °C | Fig. 4 |
| | | 26 | | $T_C$ = 110 °C | |

## Electrical Characteristics

| Parameter | Symbol | Typ. | Max. | Unit | Test Conditions | Notes |
|---|---|---|---|---|---|---|
| Forward Voltage | $V_F$ | 1.27 | 1.50 | V | $I_F$ = 4 A, $T_j$ = 25 °C | Fig. 1 |
| | | 1.37 | 1.60 | | $I_F$ = 4 A, $T_j$ = 175 °C | |
| Reverse Current | $I_R$ | 2 | 20 | µA | $V_R$ = 650 V, $T_j$ = 25 °C | Fig. 2 |
| | | 12 | 80 | | $V_R$ = 650 V, $T_j$ = 175 °C | |
| Total Capacitive Charge | $Q_C$ | 16 | | nC | $V_R$ = 400 V, $T_j$ = 25 °C | Fig. 5 |
| Total Capacitance | C | 256 | | pF | $V_R$ = 0 V, $T_j$ = 25 °C, f = 1 MHz | Fig. 6 |
| | | 32 | | | $V_R$ = 200 V, $T_j$ = 25 °C, f = 1 MHz | |
| | | 27 | | | $V_R$ = 400 V, $T_j$ = 25 °C, f = 1 MHz | |
| Capacitance Stored Energy | $E_C$ | 2.6 | | µJ | $V_R$ = 400 V | Fig. 7 |

Notes:
SiC Schottky Diodes are majority carrier devices, so there is no reverse recovery charge.

## Thermal & Mechanical Characteristics

| Parameter | Symbol | Value | Unit | Notes |
|---|---|---|---|---|
| Thermal Resistance, Junction to Case (Typical) | $R_{\theta, JC (TYP)}$ | 2.5 | °C / W | |
| Junction Temperature | $T_j$ | -55 to +175 | °C | |
| Case & Storage Temperature | $T_c$ | -55 to +175 | | |
| TO-220 Mounting Torque | - | 1 | Nm | M3 Screw |
| | | 8.8 | lbf-in | 6-32 Screw |

## Typical Performance

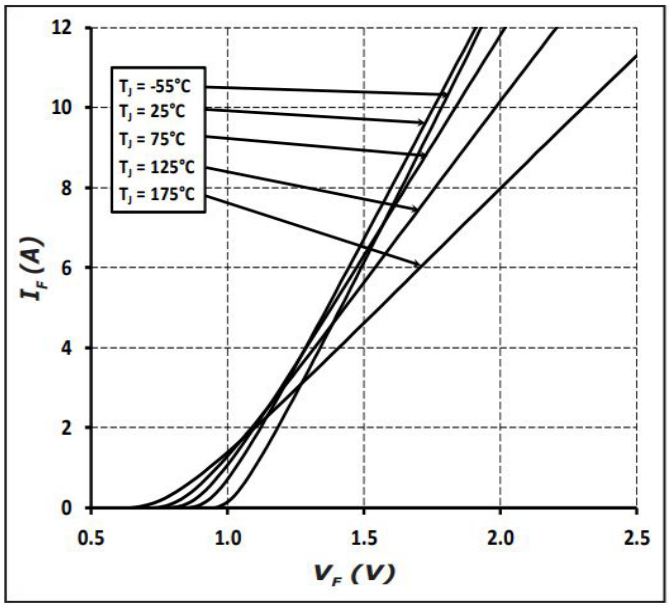



**Figure 1**
Forward Characteristics

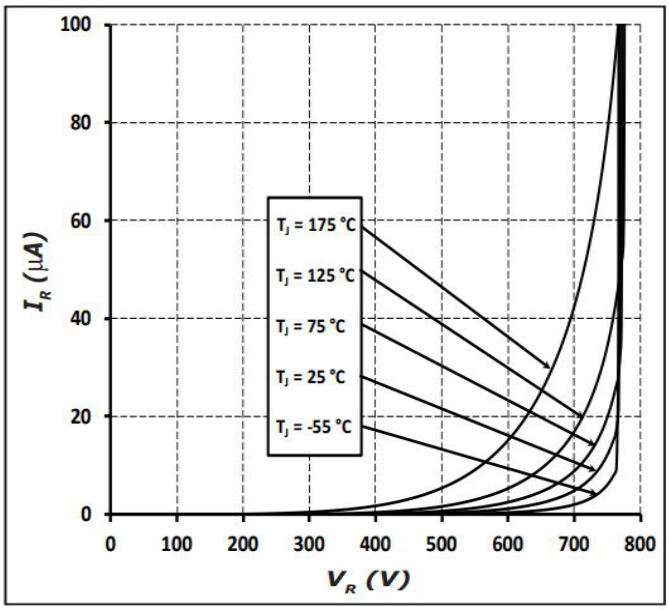



**Figure 2**
Reverse Characteristics

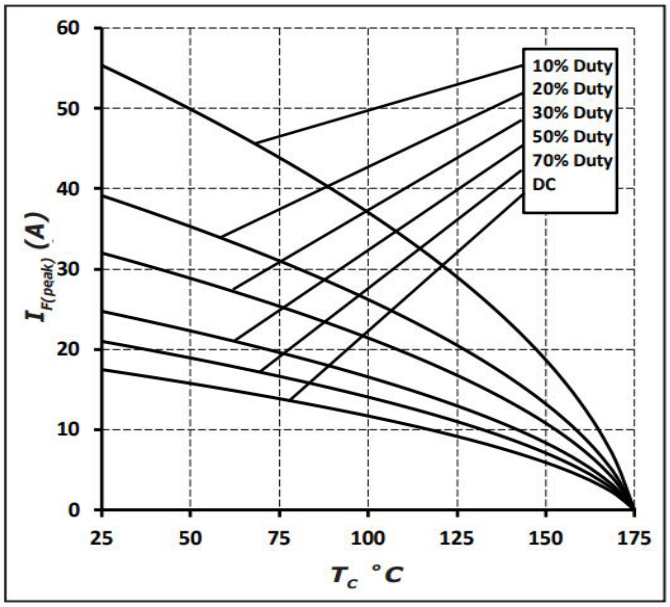



**Figure 3**
Current Derating

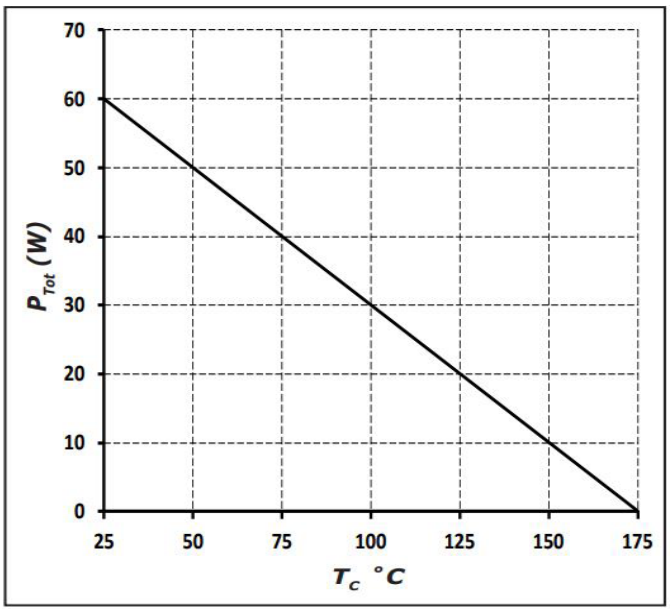



**Figure 4**
Power Derating

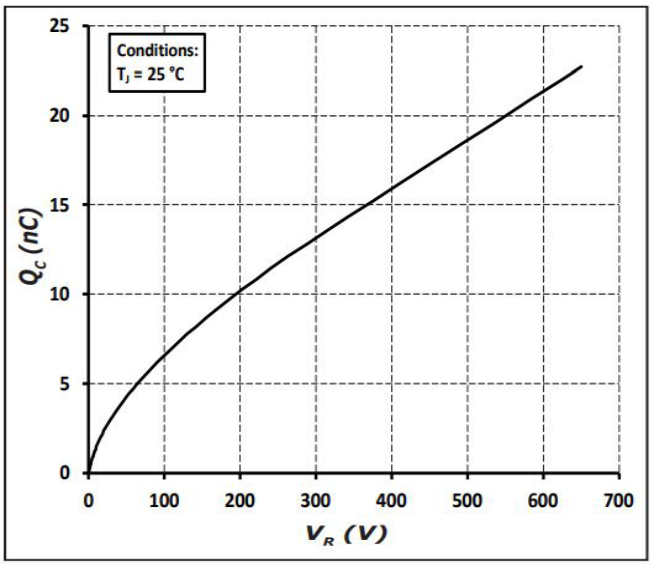



**Figure 5**
Total Capacitance vs. Reverse Voltage

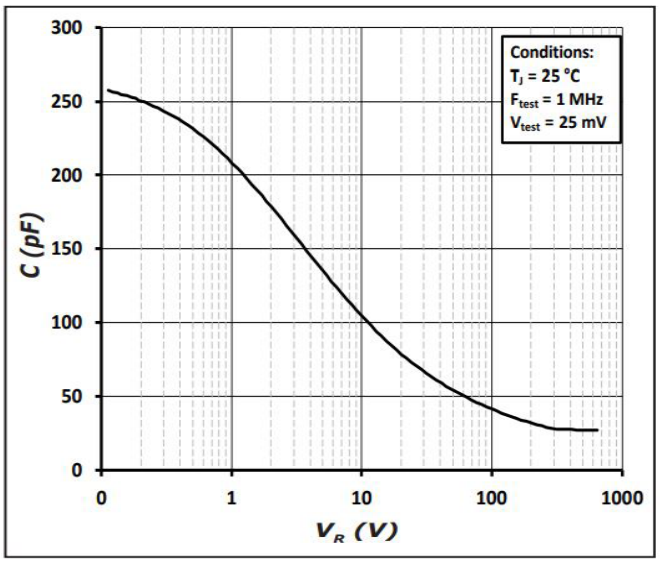



**Figure 6**
Capacitace vs. Reverse Voltage

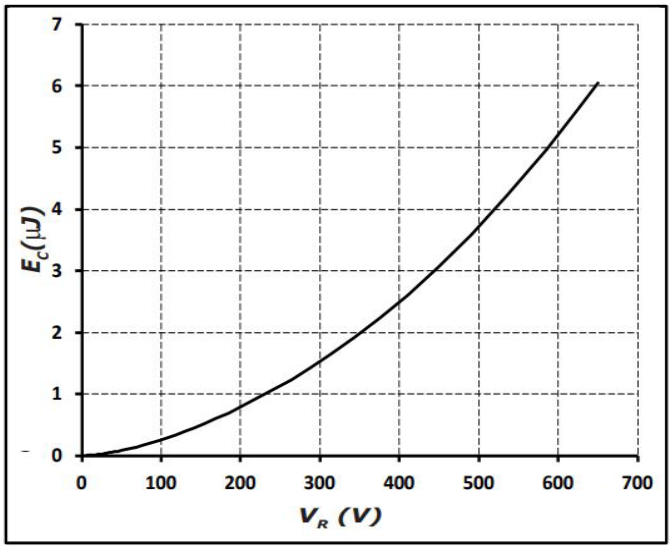



**Figure 7**
Capacitance Stored Energy

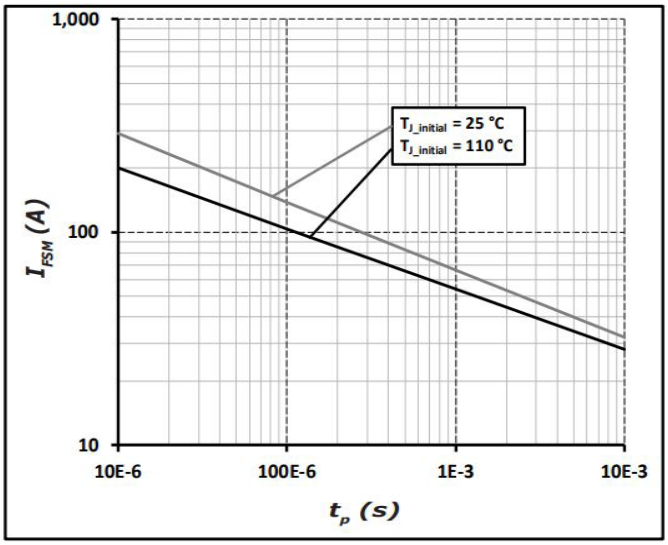



**Figure 8**
Non-Repetitive Peak Forward Surge Current versus Pulse Duration (sinusoidal waveform)

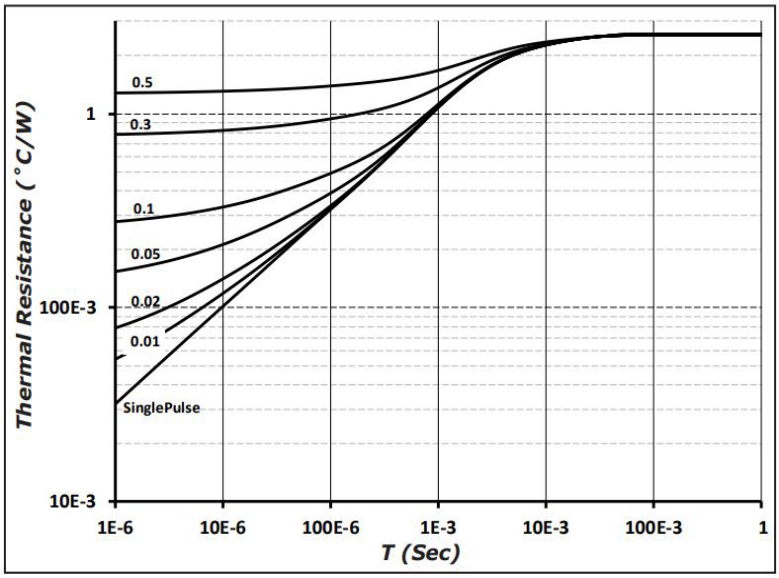
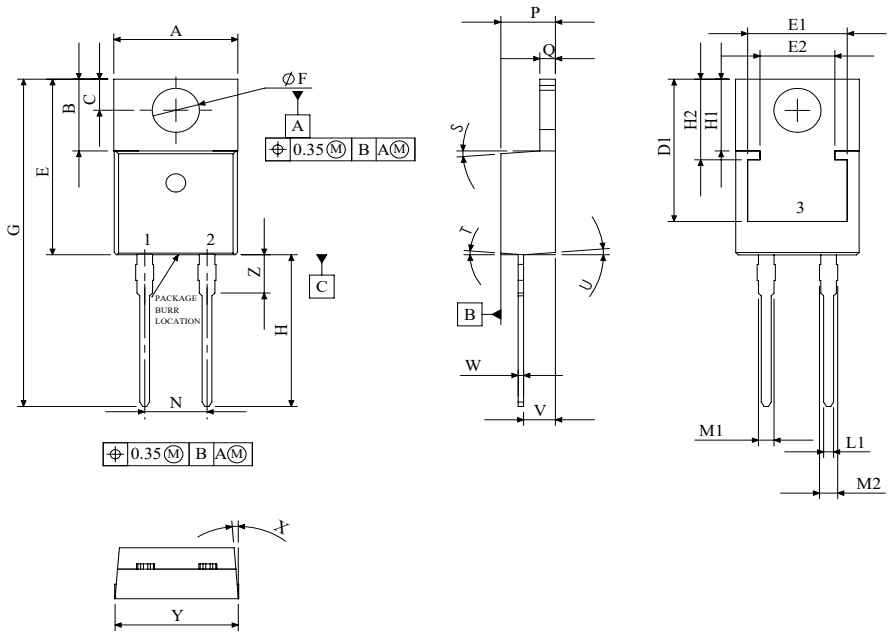



**Figure 9**
Transient Thermal Impedance

## Package Dimensions & Pin-Out

Package: TO-220-2




| SYMBOL | MIN (mm) | MAX (mm) |
|---|---|---|
| A | 9.67 | 10.41 |
| B | 5.96 | 6.48 |
| C | 2.54 | 3.05 |
| D1 | 12.45 REF | |
| E | 14.98 | 15.62 |
| E1 | 8.12 REF | |
| E2 | 6.10 REF | |
| F | 3.63 | 3.89 |
| G | 28.06 | 29.13 |
| H | 12.70 | 13.97 |
| H1 | 6.22 REF | |
| H2 | 7.04 REF | |
| L1 | 0.63 | 0.91 |
| M1 | 1.14 | 1.40 |
| M2 | 1.14 | 1.77 |
| N | 4.95 | 5.21 |
| P | 4.19 | 4.70 |
| Q | 1.21 | 1.37 |
| S | 3° | 6° |
| T | 3° | 6° |
| U | 3° | 6° |
| V | 2.38 | 2.79 |
| W | 0.35 | 0.64 |
| X | 3° | 5.5° |
| Y | 9.77 | 10.41 |
| Z | 3.30 | 3.81 |

| | |
|---|---|
| 1 | CATHODE |
| 2 | ANODE |
| 3 | CATHODE |

NOTE
1. ALL METAL SURFACES ARE TIN PLATED (MATTE), EXCEPT AREA OF CUT.
2. DIMENSIONING & TOLERANCING CONFORM TO ASME Y14.5M-1994.
3. ALL DIMENSIONS ARE LISTED IN MILLIMETERS. ANGLES ARE IN DEGREES.
4. PACKAGE BURR FLASH SIZE (0.5 mm) IS NOT INCLUDED IN THE DIMENSIONS

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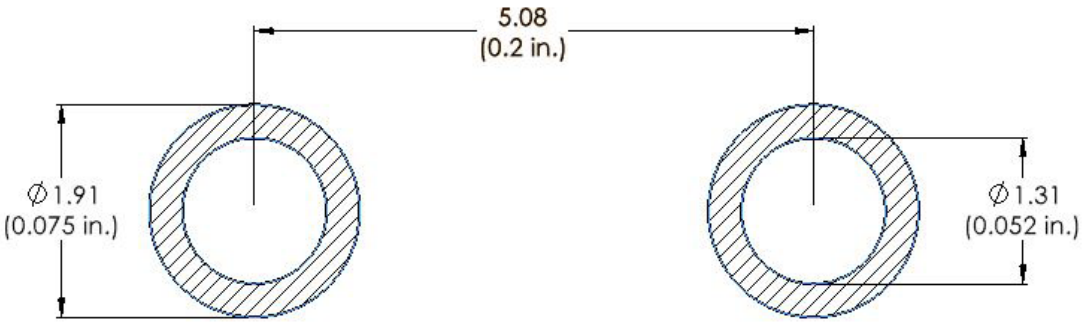
TITLE: PACKAGE OUTLINE DRAWING: TO 220-2L

REVISION NO. 02 | A4

Date: 06/18/24 | PRD-05955 | SCALE:1:1 | SHEET 1 OF 1

## Recommended Solder Pad Layout

Primary dimensions shown in mm.




## Product Ordering Information

| Order Number | Packing Type |
|---|---|
| C6D04065A | Tube |

REACh, RoHS, and Halogen-Free compliance documentation available for this product.

## Revision History

| Document Version | Date of Release | Description of Changes |
|---|---|---|
| - | October-2019 | Initial Release |
| 0 | March-2023 | Update Package Drawing<br>Update Landing Pad |
| 1 | July-2023 | Updated Test Conditions of $I_F$ and $P_{tot}$<br>Added Package Marking StatementE |
| 2 | October - 2024 | Legal disclaimer, POD |

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